

SUMMARY

Although the number of railroad and highway bridges damaged or destroyed since 1 June 1966 has increased by almost 50 percent, the Vietnamese Communists still have the capability to increase their countermeasures on lines of communications and thereby alleviate the effects of the bombings. As of 1 November, the air attacks had accounted for damage or destruction of 94 railroad and combination rail/highway bridges and 291 highway bridges. The North Vietnamese continue to support the war effort in South Vietnam by constant repair and maintenance of transportation routes to the south for continued movement of men and supplies. Repairs continue unabated on existing roads and bridges while alternate routes and stream crossings are constructed. Railroad bridges are either repaired or bypass bridges built while the most common type of countermeasure at struck highway bridges continues to be the ford.

Thus, the picture of repair and reconstruction in North Vietnam has not changed much since mid-year. As more bridges are hit, there is a correspondingly greater effort to keep transport routes open. There is no evidence suggesting that the Communists may be faltering in the carrying out of this national goal. The labor force engaged in repairs may have declined slightly because of the greater expertise acquired by workers during the past 18 months and the increased use of construction equipment on LOC's in North Vietnam and Laos. A "Nhan Dan" editorial of 11 November sums it up by saying: "We have held fast to the arteries of communication and ensured their continuity, thus enabling the various economic branches of the economy to function normally and to meet the requirements of the task of consolidating national defense."

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I. Effects of the Rolling Thunder Program

A. Damage to Bridges

A comparison of the status of bridges damaged or destroyed by air attacks since the mid year report is shown in the following tabulation.

	<u>Rail and Combination Bridges</u>			<u>Highway Bridges</u>		
	<u>1 June 1966</u>	<u>1 November 1966</u>	<u>Change</u>	<u>1 June 1966</u>	<u>1 November 1966</u>	<u>Change</u>
Damaged or Destroyed	46	94	+48	212	291	+79
Repaired	22	43	+21	45	75	+30
To be Repaired	24	51	+27	167	216	+49

At mid year the North Vietnamese had found it necessary to repair over 25 percent of the bridges damaged or destroyed, while by the beginning of November they had been able to increase the number of repaired bridges to slightly over 30 percent. Rather than effect costly and probably short lived repairs they have chosen in many cases to concentrate on the construction of alternate bypasses such as fords, ferries, pontoon bridges, and conventional temporary bridges.

The use of temporary expedients to ensure continuous transport continues to be attractive to the North Vietnamese not only because the expedients are generally less vulnerable to air attack, but also because they can be implemented at far less cost. The permanent repair or reconstruction of the bridges attacked to date would cost North Vietnam an estimated \$18.3 million; the cost of temporary repairs and other expedients to maintain traffic, however, has been only 15 percent of this amount.

II. Countermeasures to Air Attack

A. North Vietnam

1. Repair of Bridges

The response of the North Vietnamese to air attacks has been to provide

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one or more alternate temporary crossings near the site of a damaged bridge. At mid year a total of 173 alternate crossings had been confirmed by aerial photography; this has now risen by at least 90 percent to a total of 329 alternate crossings. (See Table 1 for a comparison of damage and countermeasures of all types.)

The most striking innovation in countermeasures since mid-year has been the construction of cable bridges at important crossings on strategic routes throughout North Vietnam. This technique requires the use of steel cables stretched across the open portion of the destroyed bridge to act as support for removable deck sections. The latest confirmed count shows that 35 highway bridges as well as 7 railway bridges on the rail line south of Hanoi are using this method of repair. While repair by cables and deck panels may not be as good structurally as the conventional short wood span supported by lattice piers, it does have a deceptive advantage in allowing the decking to be removed during day light thus reducing the vulnerability of the bridge to air attack and giving the impression that the bridge is still unusable. In

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addition, two decoy bridges [REDACTED] This consists of rope or light steel cable stretched across a stream and covered with garnished netting to appear as an operable crossing. Approaches are cleared to either end of the bridge to complete the deception. The success of the innovation represented by cable and decoy bridges is in itself reason enough to expect other and probably more sophisticated responses to bomb damage as air strikes continue.

## B. Laos

### 1. Repair of Lines of Communications

Although the infiltration and supply road network through the Laos panhandle was greatly expanded before the 1966 Laotian rainy season, the restoration

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of through service on the entire network has not been achieved as quickly during the

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present dry season. [REDACTED]

that the roads from Mu Gia Pass to

Route 9 in the Tchepone area are serviceable and repairs are underway on other routes.

Routes south from Tchepone however, have not been repaired sufficiently to allow

through traffic to the tri-border area. Repair work could have been delayed by rain

continuing longer than usual or because the route through Laos has been augmented by

infiltration directly across the DMZ into Quang Tri Province of South Vietnam. The

road network through the Laos panhandle probably will continue to be used to support

Communist operations in Kontum and Pleiku Provinces and as a supplement to movement

through the DMZ.

#### C. Resources Used in Repair Work

The labor force engaged in repair and maintenance of lines of communications

in North Vietnam and Laos may have declined slightly because of the additional exper-

tise acquired since the start of the bombings. Construction workers permanently

assigned to repair and maintenance are estimated to total 60,000 - 70,000 in North

Vietnam and 20,000 - 25,000 in Laos. They have acquired new and unique skills, and

have learned to survive in their hazardous work environment.

More construction equipment is being used now in repair work than at the

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start of the bombings. [REDACTED]

construction equipment such as

bulldozers, graders and trucks in the process of repair work on LOC's in North Vietnam

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and Laos. [REDACTED]

from

workcamps concerning the status of equipment indicate more widespread use of con-

struction equipment. Some of this equipment has been destroyed or damaged by air

strikes, but continued imports of construction equipment from the USSR and East Euro-

pean Communist countries probably tends to offset such losses.

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Centralized management of repairs has enabled the North Vietnamese and Laotian Communists to plan their countermeasures and increase the rate of repair. Through a system of workcamps, they have prepositioned labor and materials in anticipation of air strikes. This has greatly increased their efficiency and speed of recuperation on those routes considered important to the movement of supplies to South Vietnam.

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Table 1

Bomb Damage to Bridges in North Vietnam  
and Countermeasures as of 1 November 1966

	Damaged or Destroyed		Estimated Number of Strikes and Restrikes Result- ing in Bridge Damage	Estimated Countermeasures of All Types <sup>a/</sup>
	<u>1 June</u>	<u>1 November</u>	<u>1 November</u>	<u>1 November</u>
All Bridges (Total)	<u>258</u>	<u>385</u>	<u>575</u>	<u>532</u>
Highway (Total)	<u>211</u>	<u>291</u>	<u>422</u>	<u>372</u>
Railroad (only) Total	<u>37</u>	<u>73</u>	<u>124</u>	<u>132</u>
Hanoi-South	20	49	82	69
Hanoi-Dong Dang	2	2	5	15
Hanoi-Haiphong	0	0	0	0
Hanoi-Lao Cai	13	19	33	31
Tramway	2	2	2	2
Kep-Thai Nguyen	0	1	2	1
Combination (Total)	<u>10</u>	<u>21</u>	<u>29</u>	<u>28</u>
Hanoi-South	7	16	22	16
Hanoi-Dong Dang	1	2	2	5
Hanoi-Haiphong	2	2	4	3
Hanoi-Lao Cai	0	1	1	4

a. Includes temporary repairs of the original bridges.

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